Histological studies and immunohistochemistry for activated caspase-3 in Javanese medaka (*Oryzias javanicus*) exposed to different concentrations of zinc pyrithione (ZnPT)

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Abstract

The uses of organotin biocides have been completely banned utilized as active biocides in antifouling paints since the early 1960s. The effectiveness of Zinc pyrithione (ZnPT) against bacteria, fungi and algae make them as one of the organic biocides replacements for organotin compound in antifouling paints. ZnPT also widely used as active ingredients in anti-dandruff shampoos or as additive in cosmetics and dermatitis treatment. This study investigates the ecotoxicological effect of zinc pyrithione in a new model fish species known as Javanese medaka (*Oryzias javanicus*) under sublethal level and the effects of ZnPT exposure on the gonads via histological studies and evaluated quantification of apoptosis in tissue sections using antibodies that specifically recognize activated caspase-3. Zinc pyrithione caused non-specific and reversible tissue alterations in liver, kidney and gonad of exposed organisms. Then, gonadal staging of gonad in exposed organism shows significantly different from control group. Study also showed that the oocytes at their different stages of maturation get affected differently at various concentration of ZnPT. With accumulating knowledge of the molecular mechanisms of cell death and the discovery of the caspases as key mediators of apoptosis, more direct and earlier measurements of apoptosis in tissue sections have emerged. Apoptotic cells were quantified and apoptotic indices were calculated following identification of apoptotic cells by morphological analysis activated caspase-3 immunohistochemistry. The results indicated that activated caspase-3 immunohistochemistry was an easy, sensitive, and reliable method for detecting and quantifying apoptosis in this model. Activated caspase-3 immunohistochemistry is therefore recommended for the detection and quantification of apoptosis in tissue sections.

Keywords: Antifouling, zinc pyrithione, Javanese medaka, histological alteration, metallothionen.

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